FARMR!SK

A new tool for risk-based biosecurity advice

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BIOSECURE

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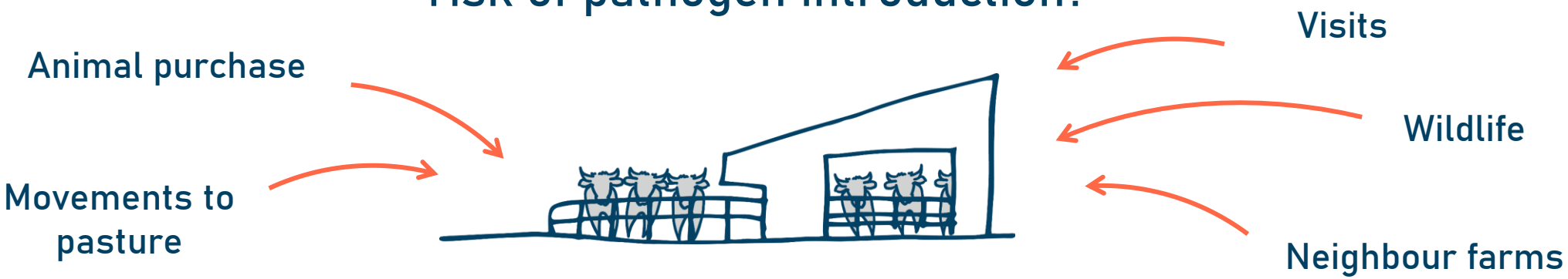
We know that biosecurity is crucial, but there are still many challenges to its implementation…

Quantitative risk analysis model to provide tailored farm recommendations

How do different pathways contribute to overall risk of pathogen introduction?



Which biosecurity measures should be prioritized to reduce risk?

Diagnostic tests

Use of own vehicle

Clean and disinfect

Quarantine

Exclusive material

Prevent contact with wildlife

Methodology

Risk pathways for

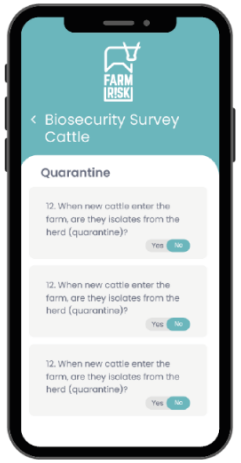
IBR

BVD

Tuberculosis

Dairy & Beef Cattle farms

On-farm survey



What-if scenarios

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Risk analysis algorithm

PARA METRA

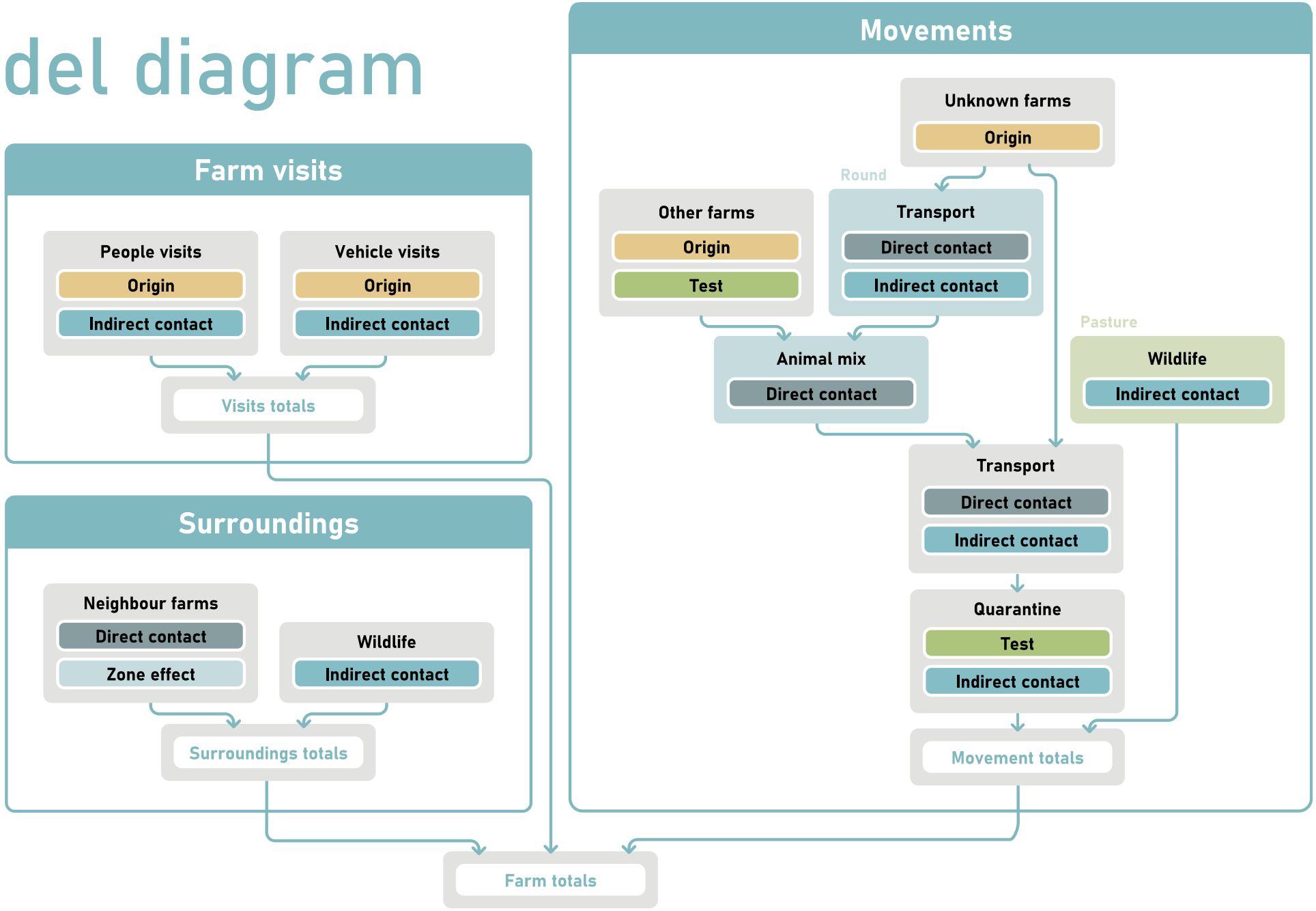
Parameters database

(Antonopoulos, 2024)

Results report

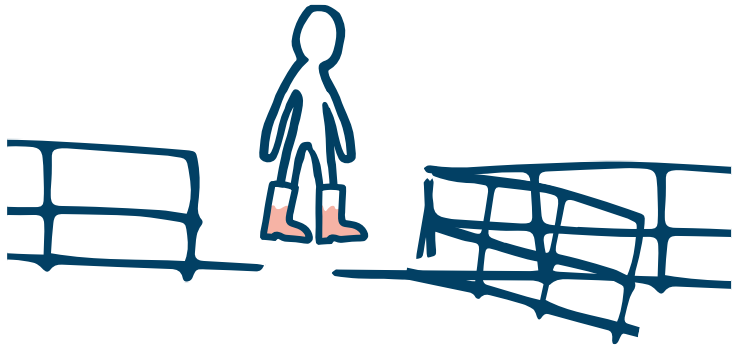
Decision making

Model diagram

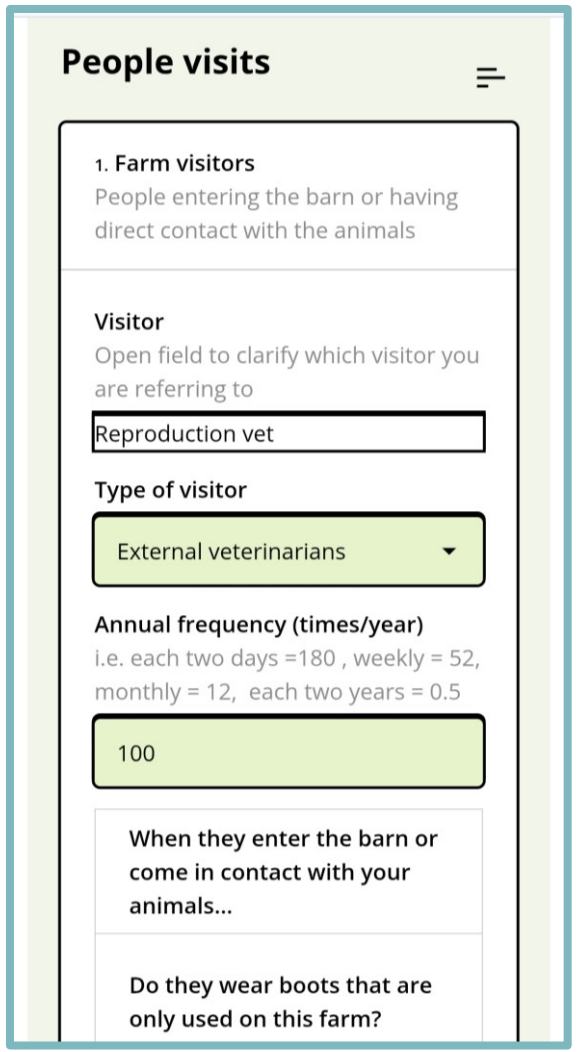


People Visits

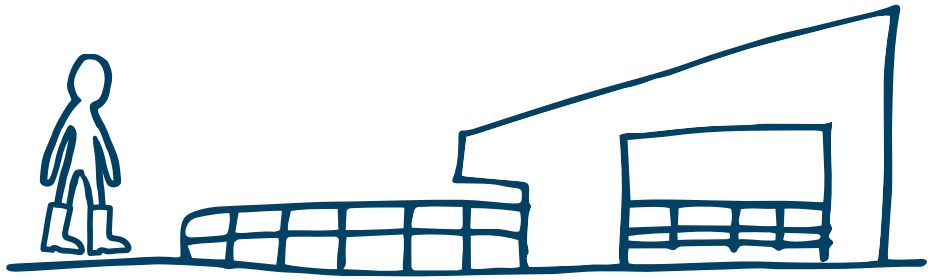
What is the risk of a visitor
introducing a pathogen into the farm?



People Visits



People Visits



Use of boots/equipment in other farm

No — Yes

100%

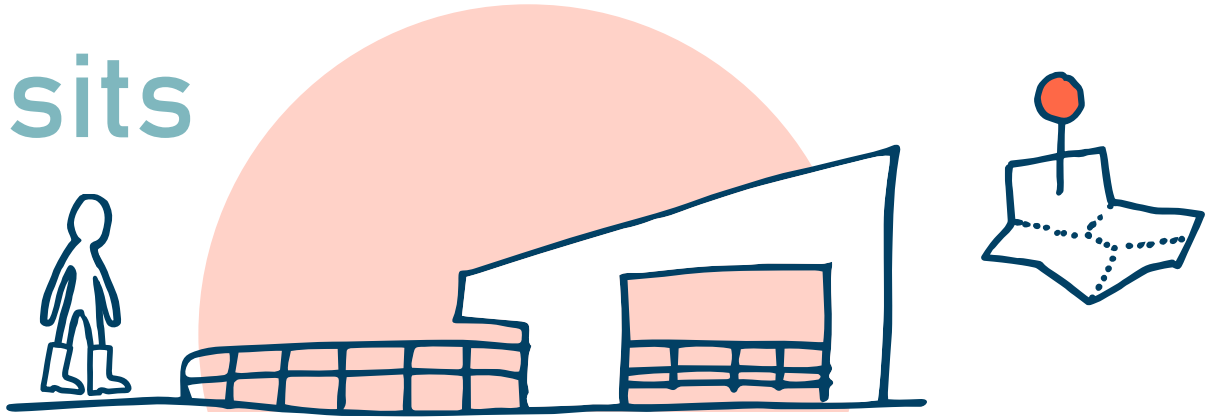
Type of visitor

External veterinarians

Do they wear boots that are only used on this farm?

- Always
- Sometimes
- Never

People Visits



Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

30%

Regional prevalence (28-32%)

People Visits

Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

Infected animal

No

Yes

15 %

Within-herd prevalence (45-55%)

People Visits

Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

Infected animal

No

Yes

Infectious animal

No

1.5%

Boots/equipment contaminated

Probability an infected animal is infectious (8-10%)

People Visits

Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

Infected animal

No

Yes

Infectious animal

No

Yes

Survival after cleaning & desinfection

No

Yes

0.8%

If they wear boots used on other farms, are they clean and disinfected when they enter the farm?

- Always
- Sometimes
- Never
- Don't know

Probability boots are cleaned (20-38%)
Cleaning efficacy (40-90%)

People Visits

Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

Infected animal

No

Yes

Infectious animal

No

Yes

Survival after cleaning & desinfection

No

Yes

Survival on surface

No

Yes

0.04%

Inactivation constant (k = 0.01)
Time between visits (0.3-2h)

People Visits

Use of boots/equipment in other farm

No

Yes

Infected farm

No

Yes

Infected animal

No

Yes

Infectious animal

No

Yes

Survival after cleaning & desinfection

No

Yes

Survival on surface

No

Yes

Contact with susceptible animal

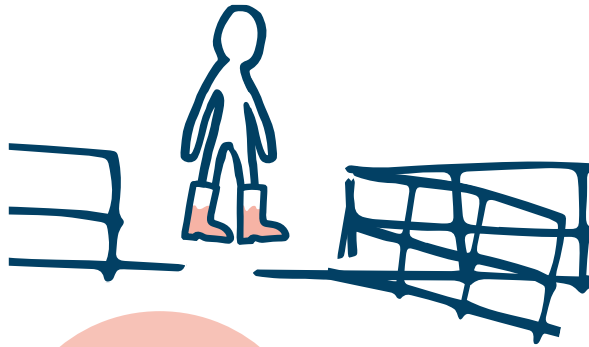
No

Yes

Susceptible animal gets infected

No

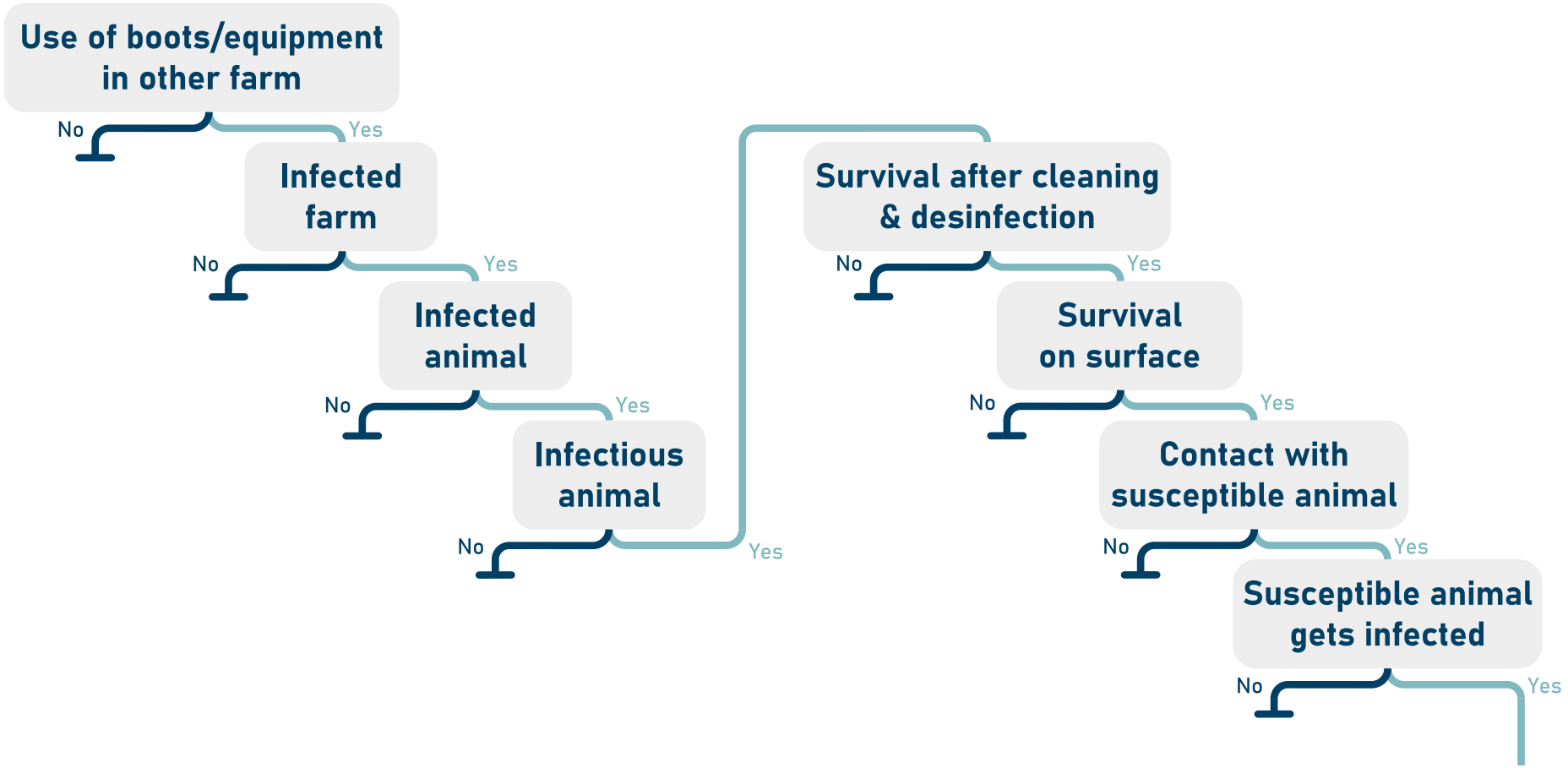
Yes

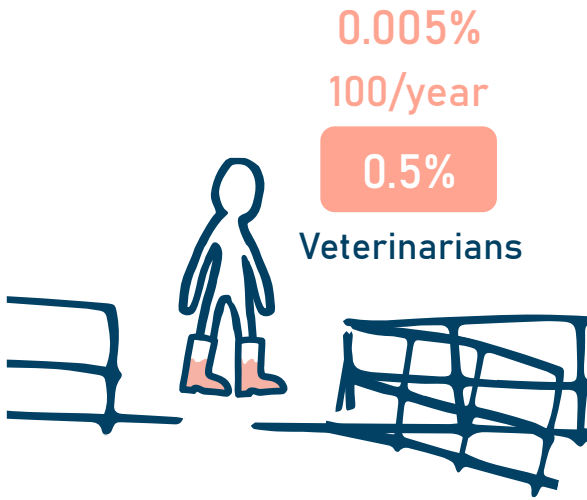


Probability transmission via indirect contact (10-15%)

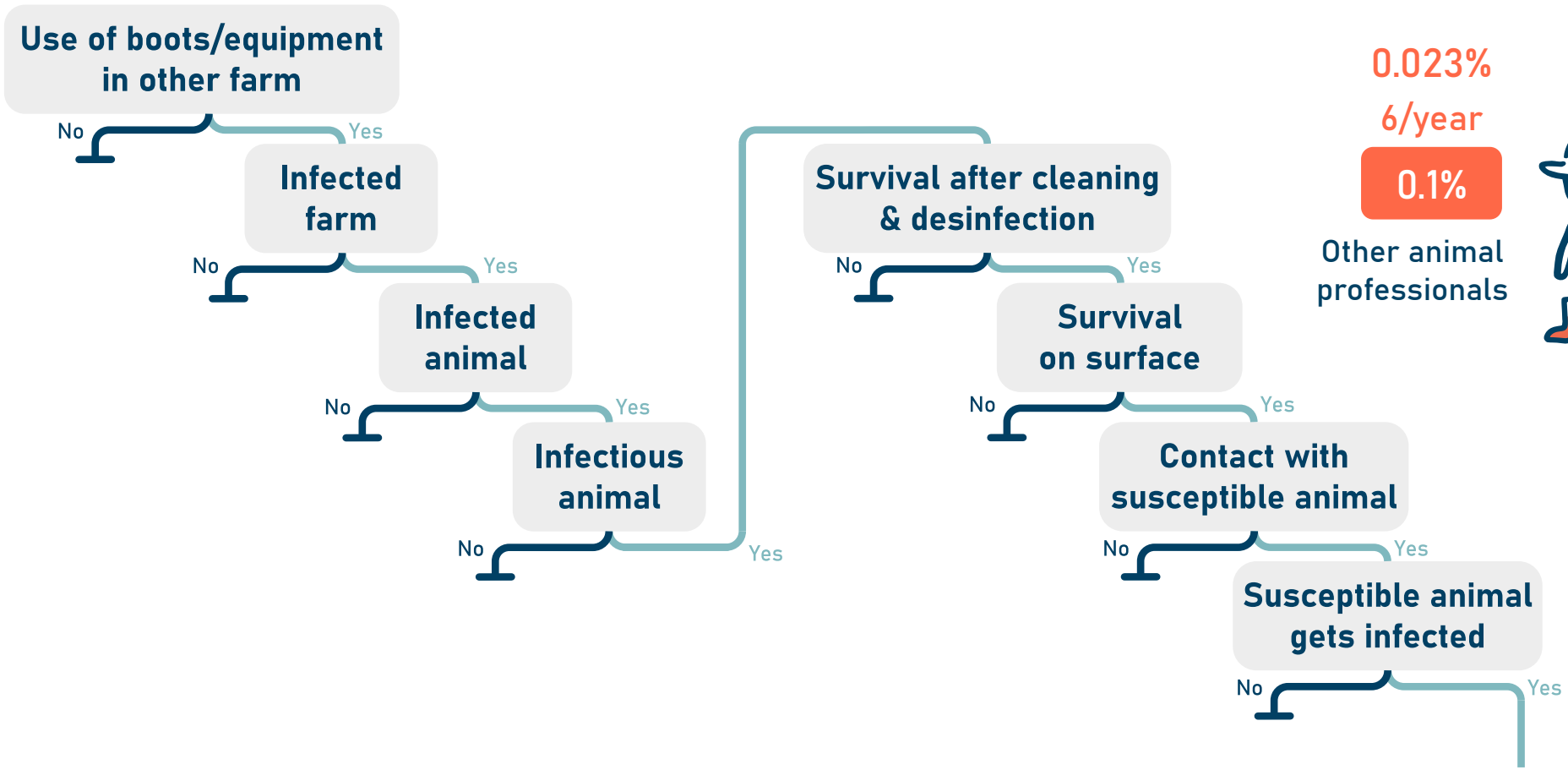
0.005%

People Visits





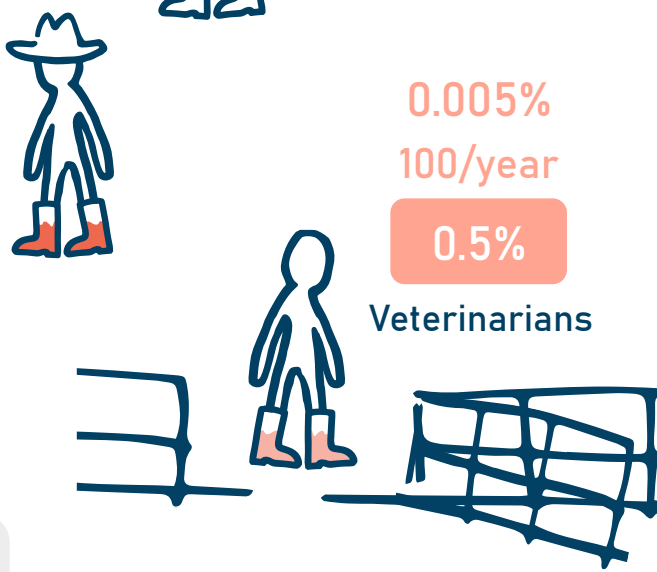
People Visits



0.001%
4/year
0.004%
Other farmers

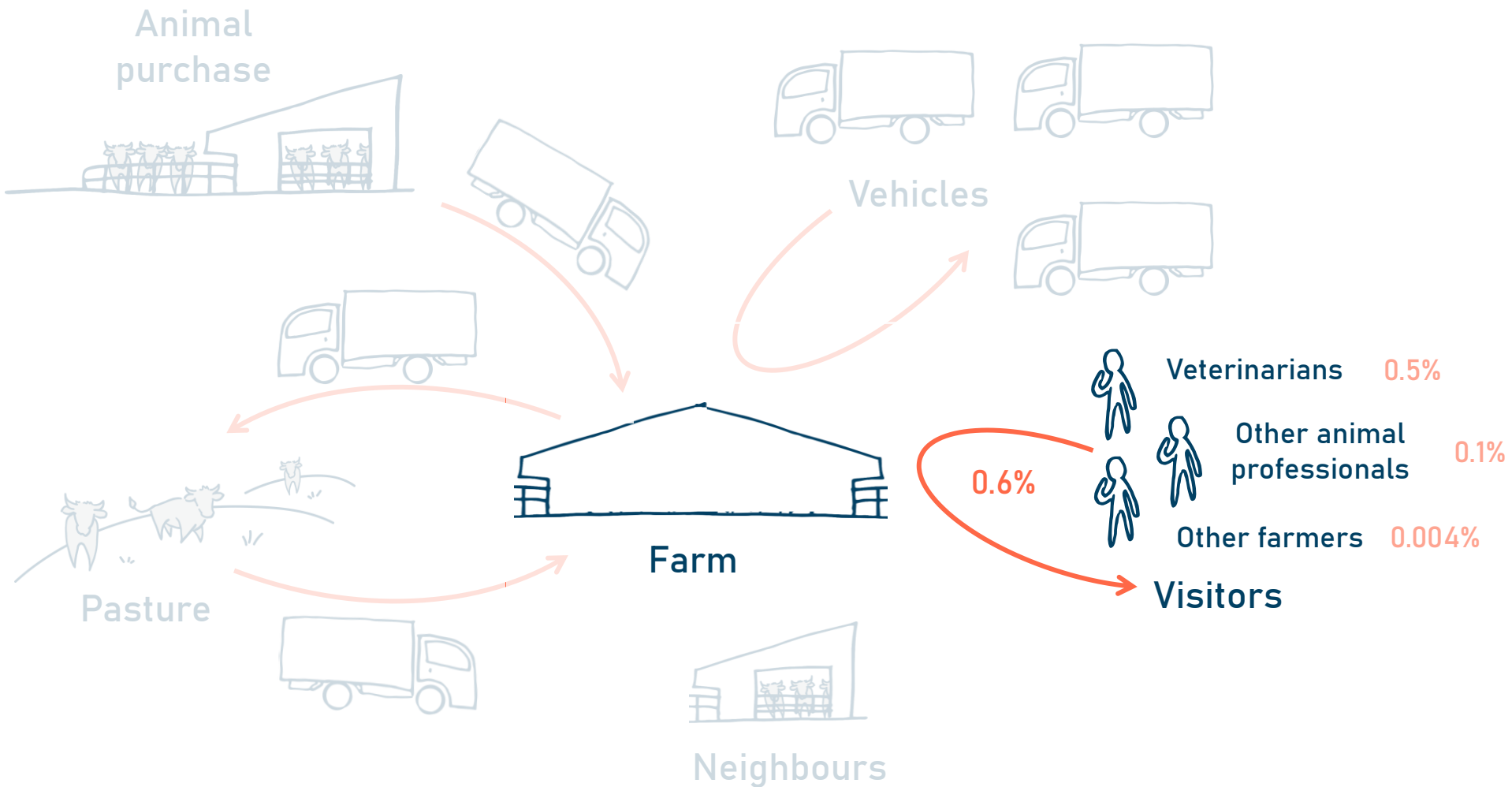
0.023%
6/year
0.1%
Other animal professionals

0.005%
100/year
0.5%
Veterinarians



What is the probability of pathogen entry?

% Annual Risk of IBR entry



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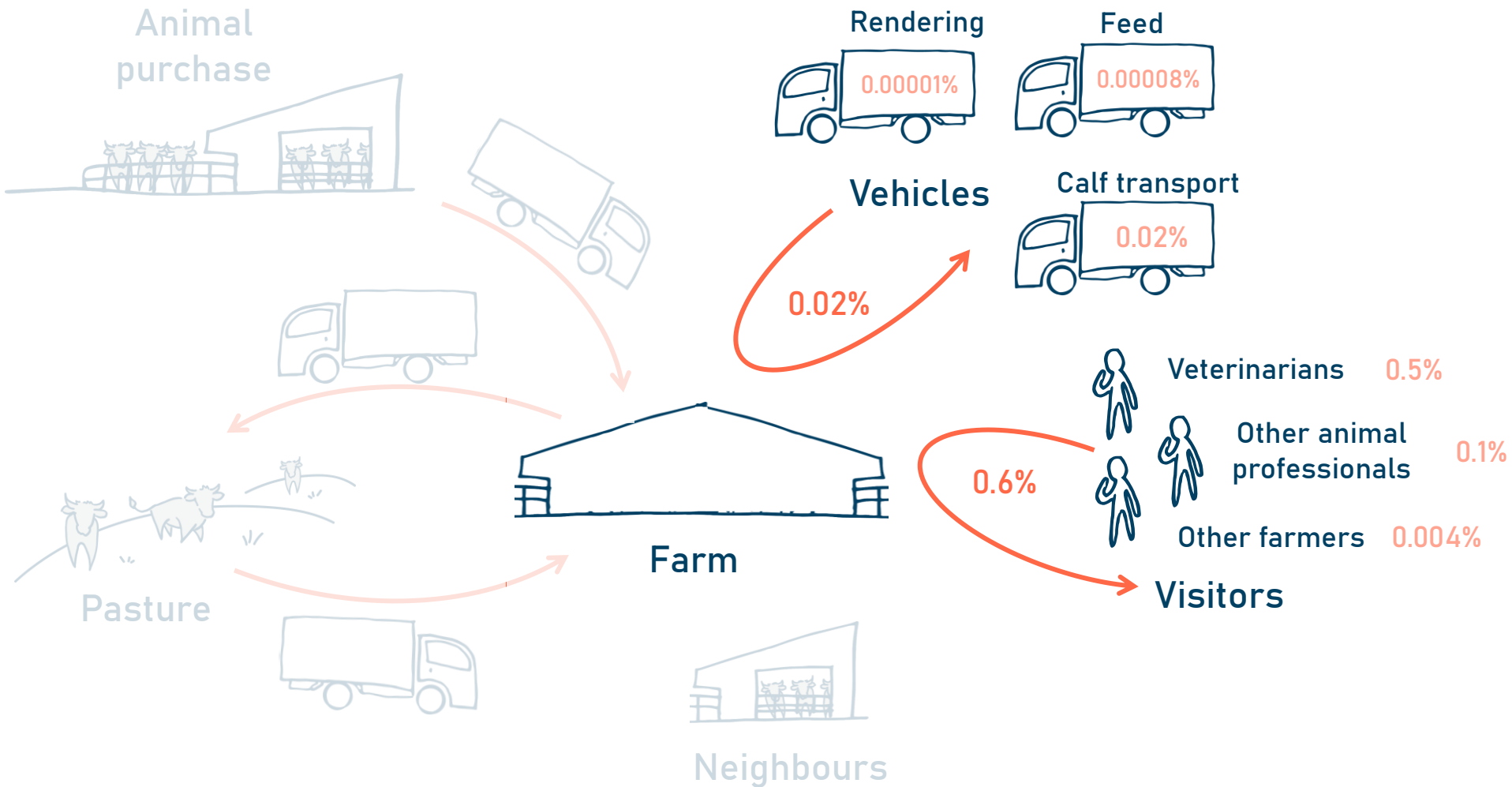

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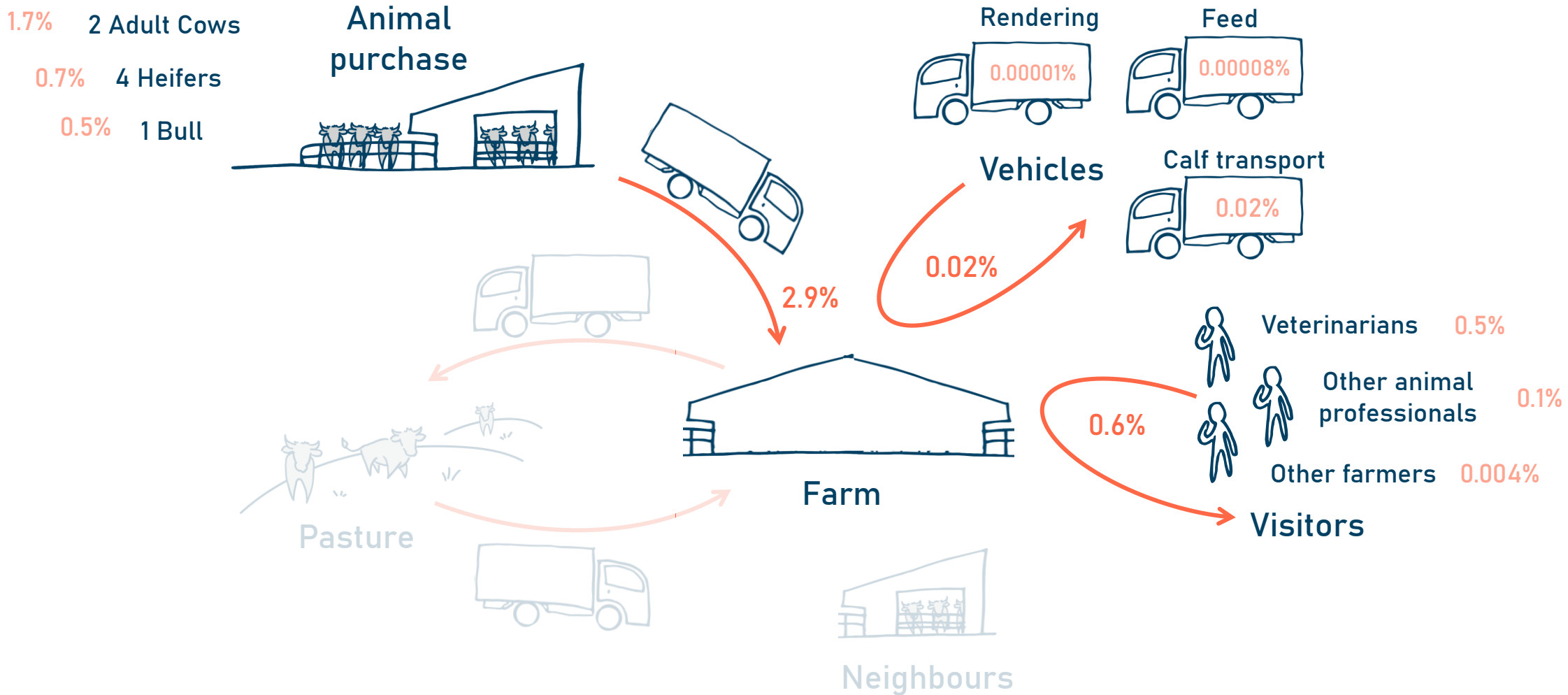

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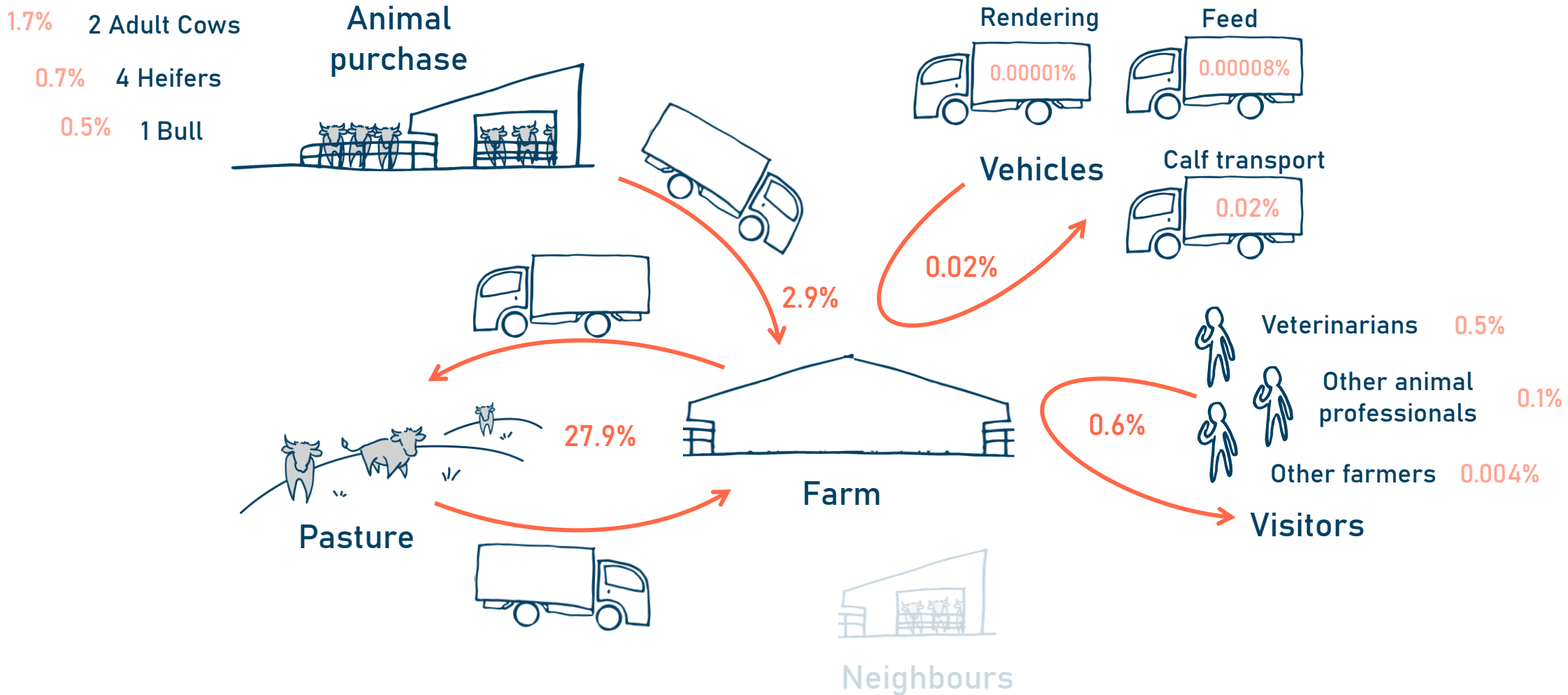

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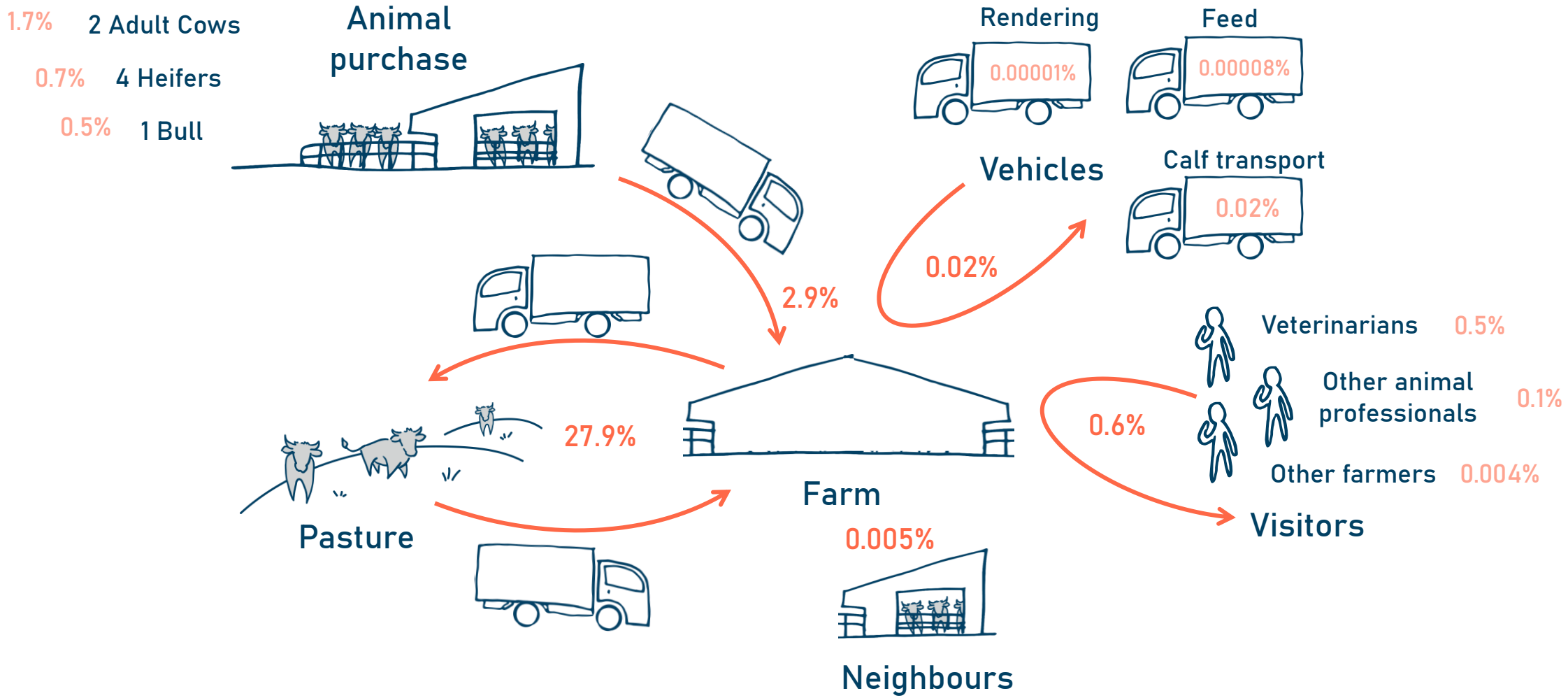

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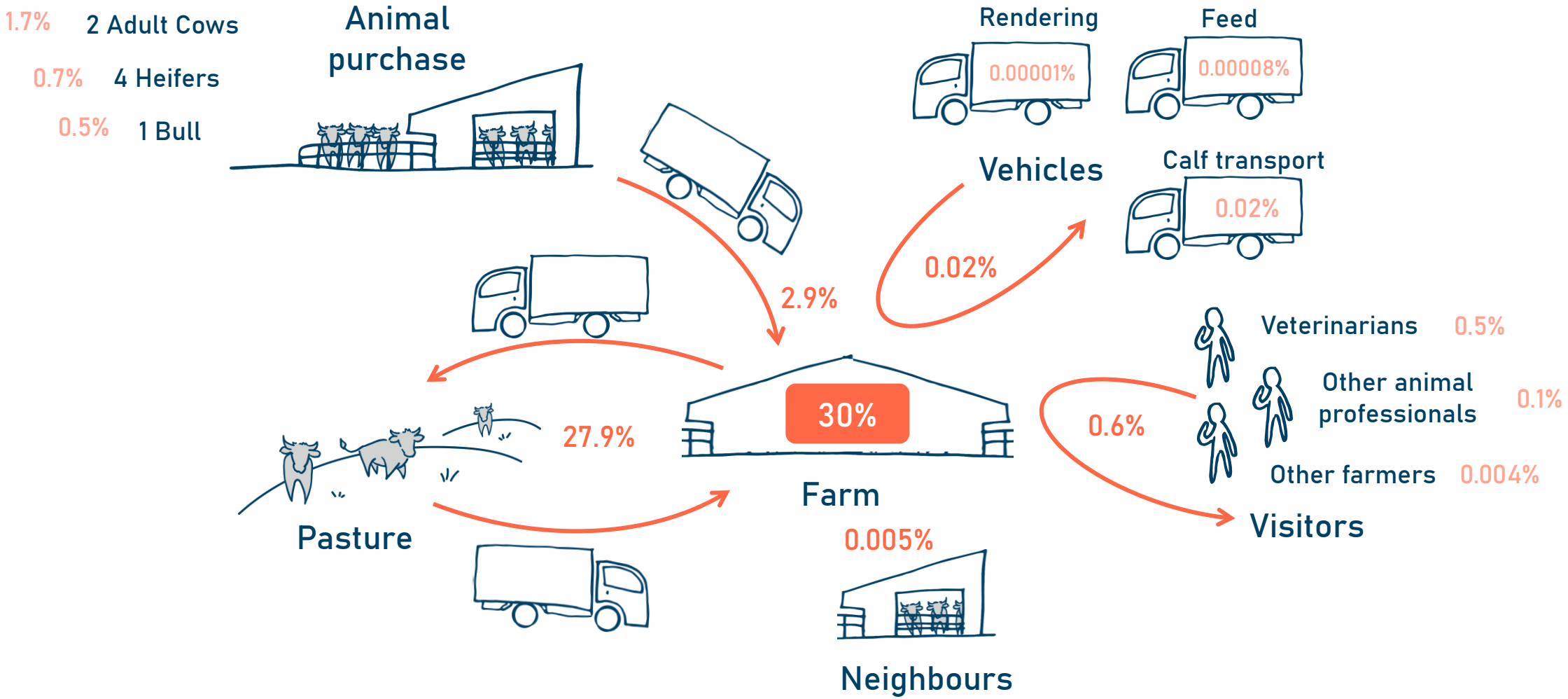

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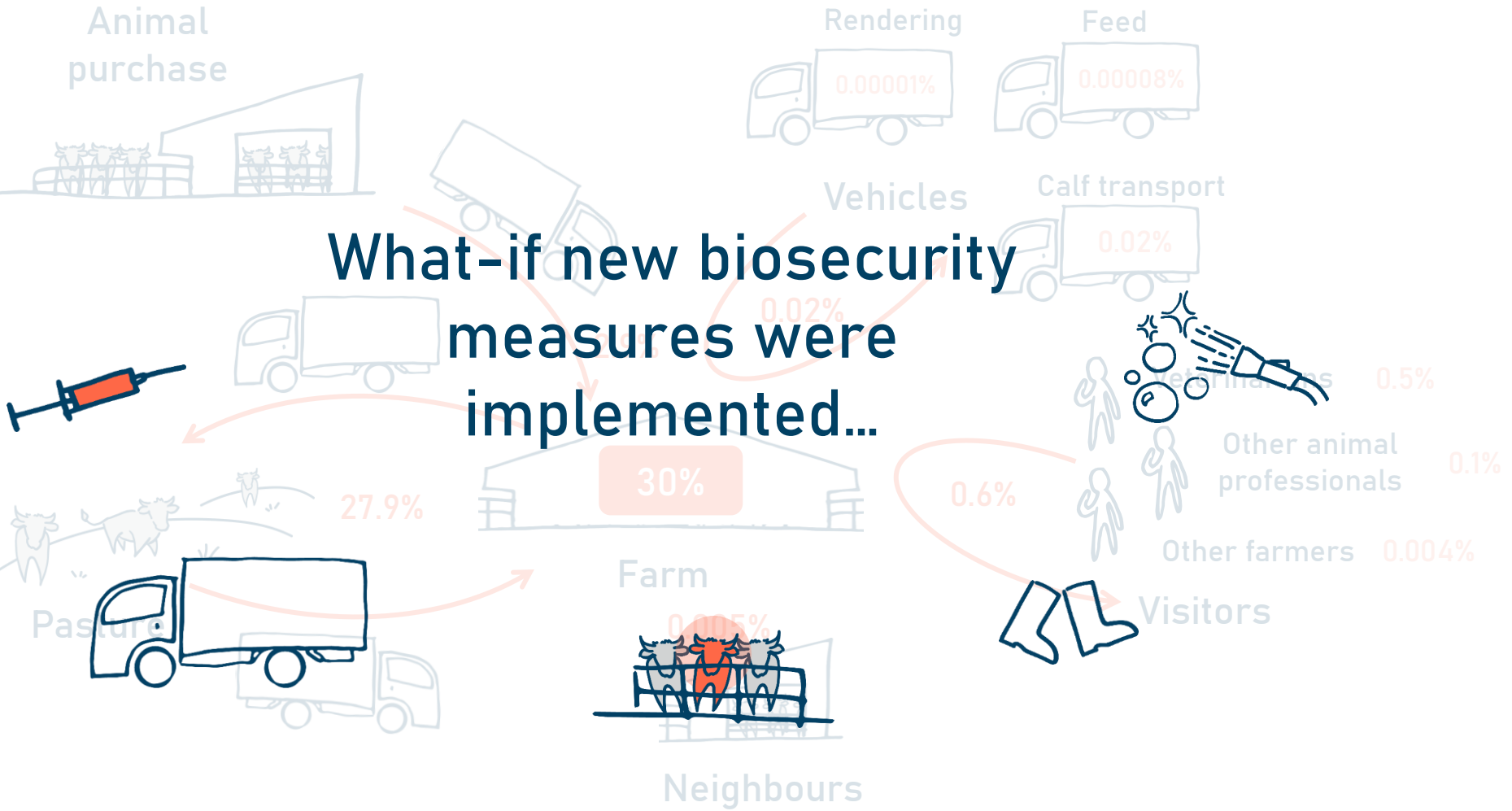
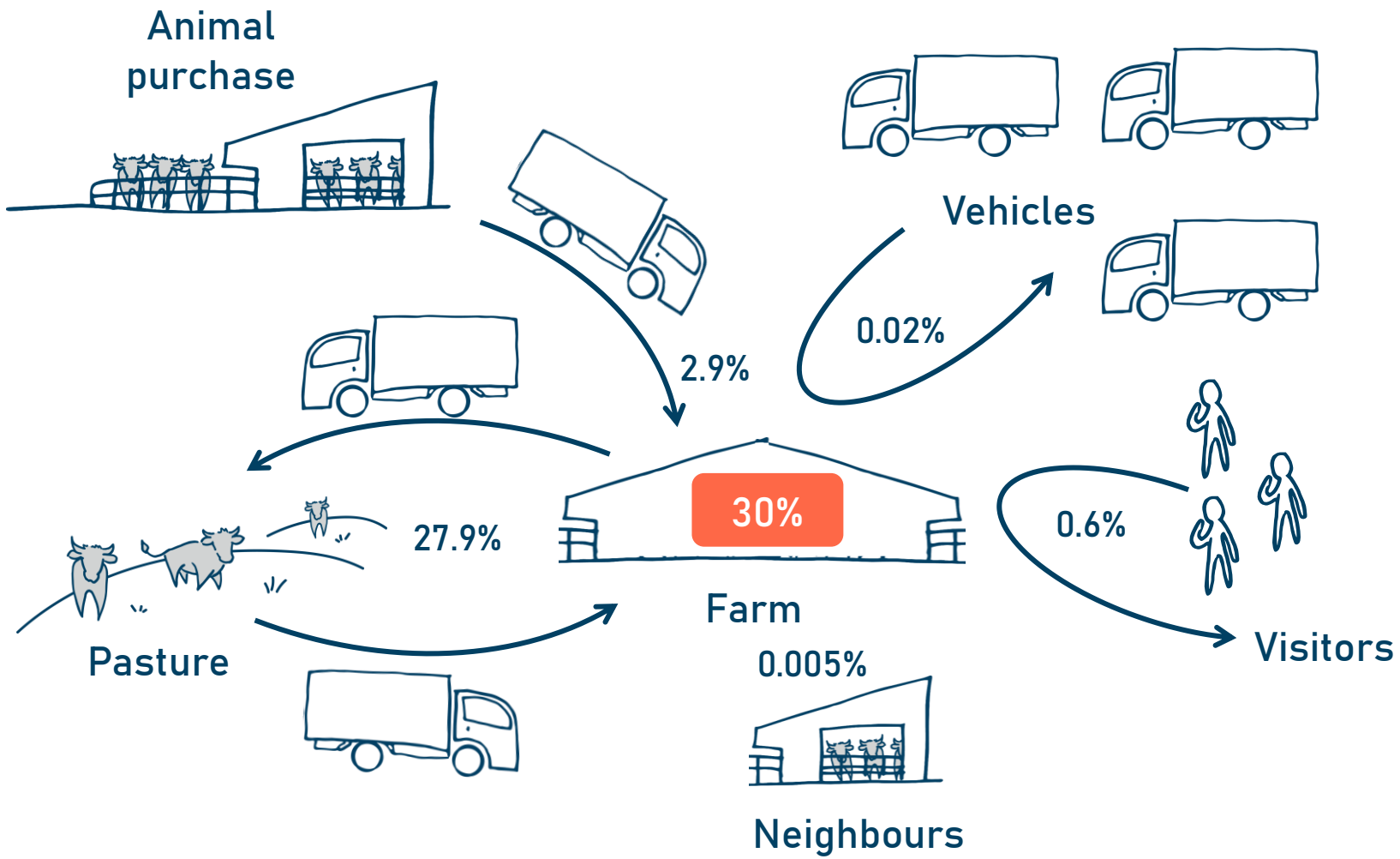


What-if new biosecurity measures were implemented…

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk 30%



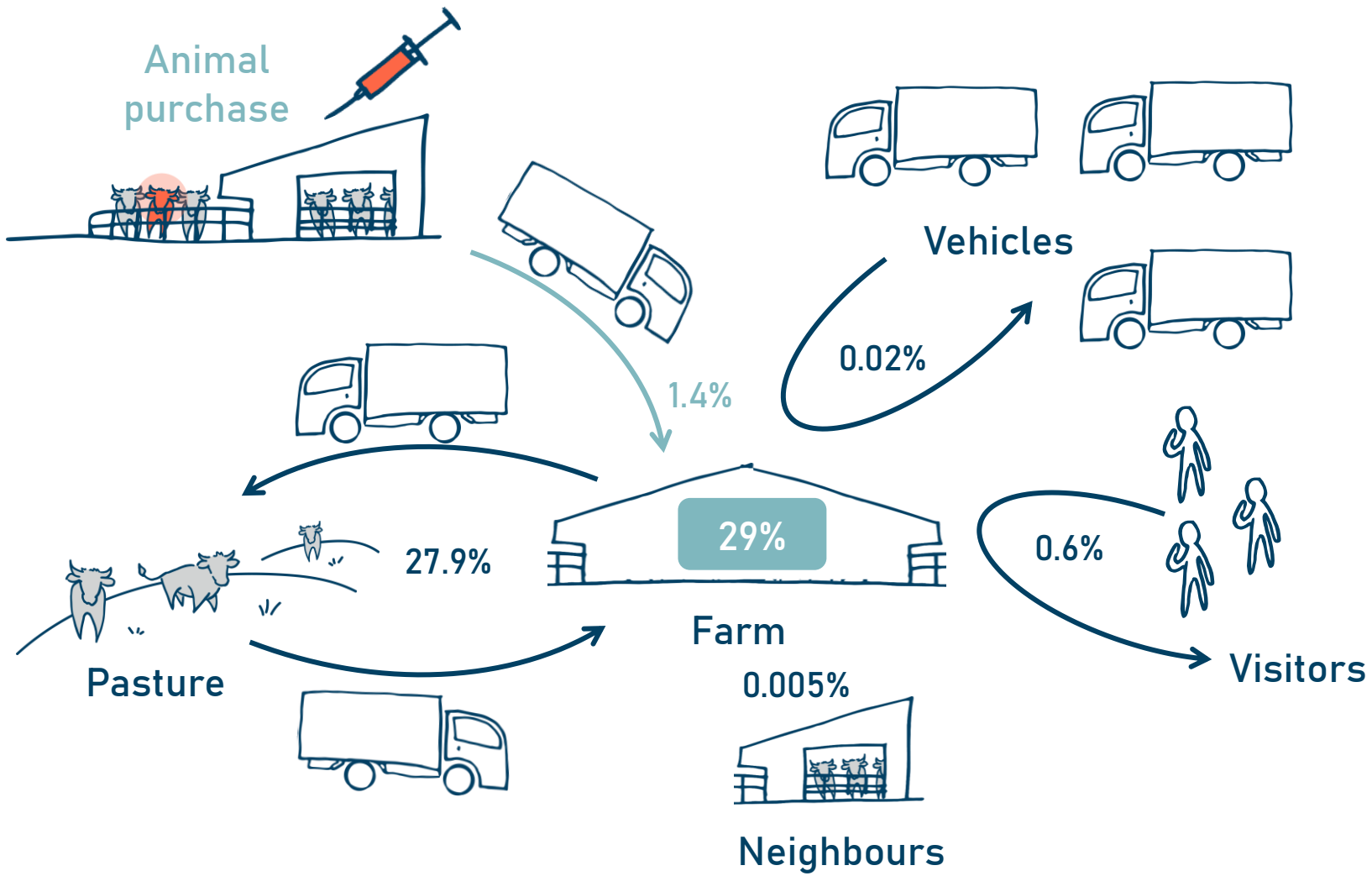
What-if...

- Test before purchase
- Quarantine and test new animals
- Screening all herds before pasture
- Do not share pastures
- No vehicles entering the farm perimeter
- Provide boots to all visitors

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk 30%



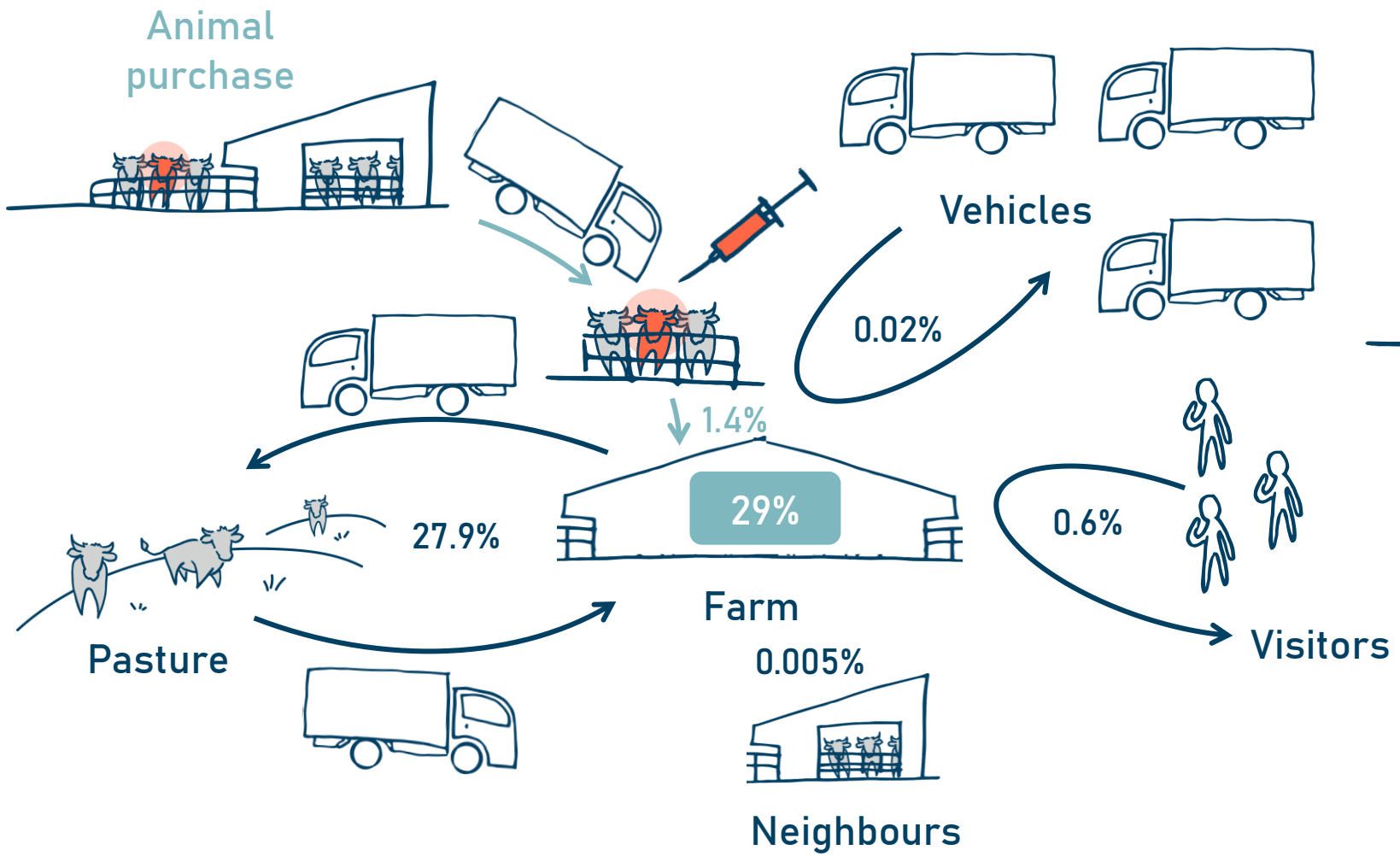
What-if...

Test before purchase	29%
Quarantine and test new animals	
Screening all herds before pasture	
Do not share pastures	
No vehicles entering the farm perimeter	
Provide boots to all visitors	

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk **30%**



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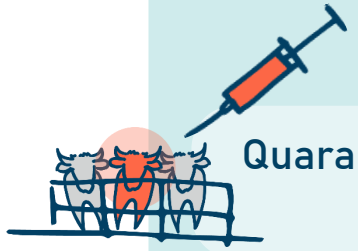
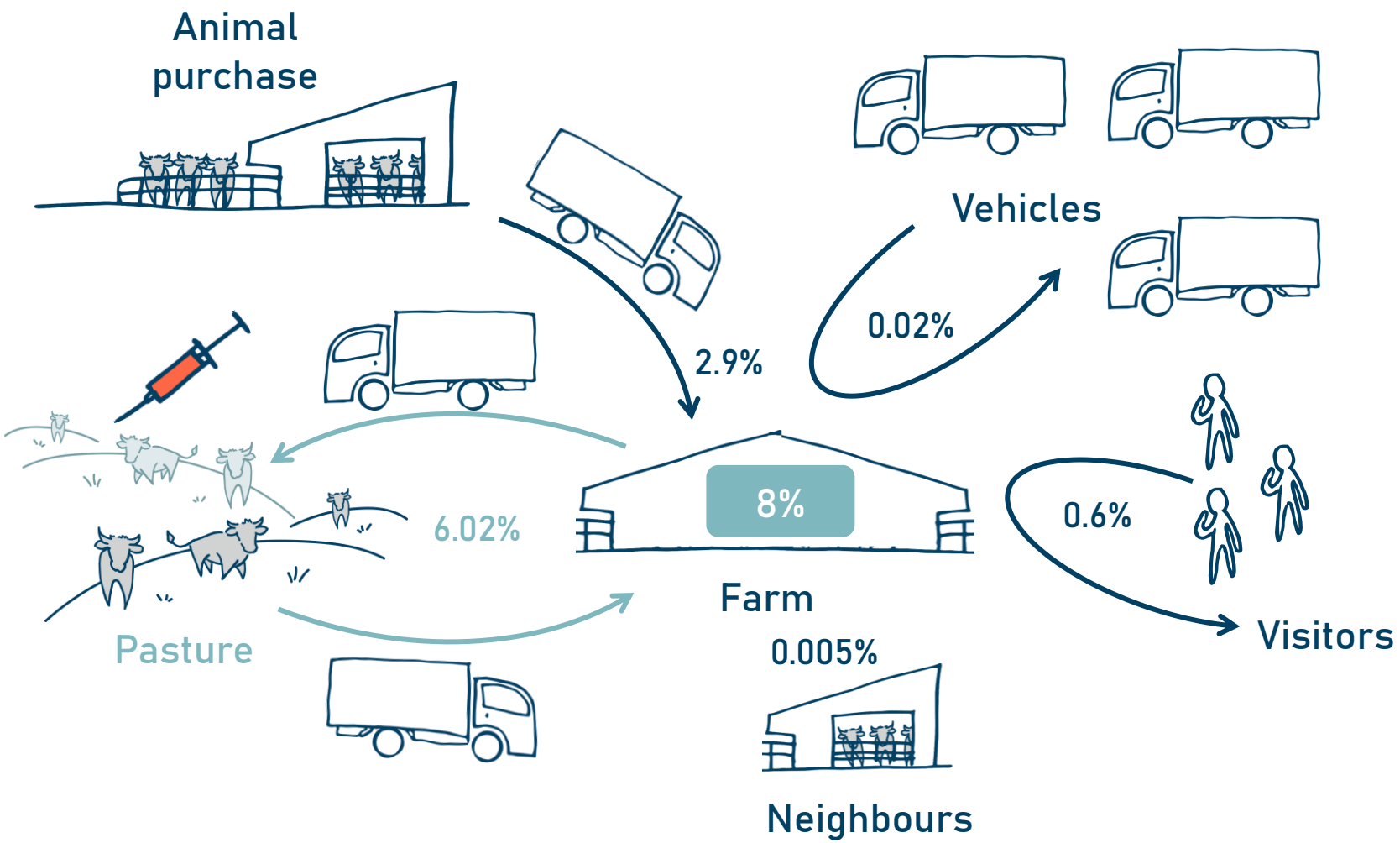


Test before purchase	29%
Quarantine and test new animals	29%
Screening all herds before pasture	
Do not share pastures	
No vehicles entering the farm perimeter	
Provide boots to all visitors	

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk **30%**



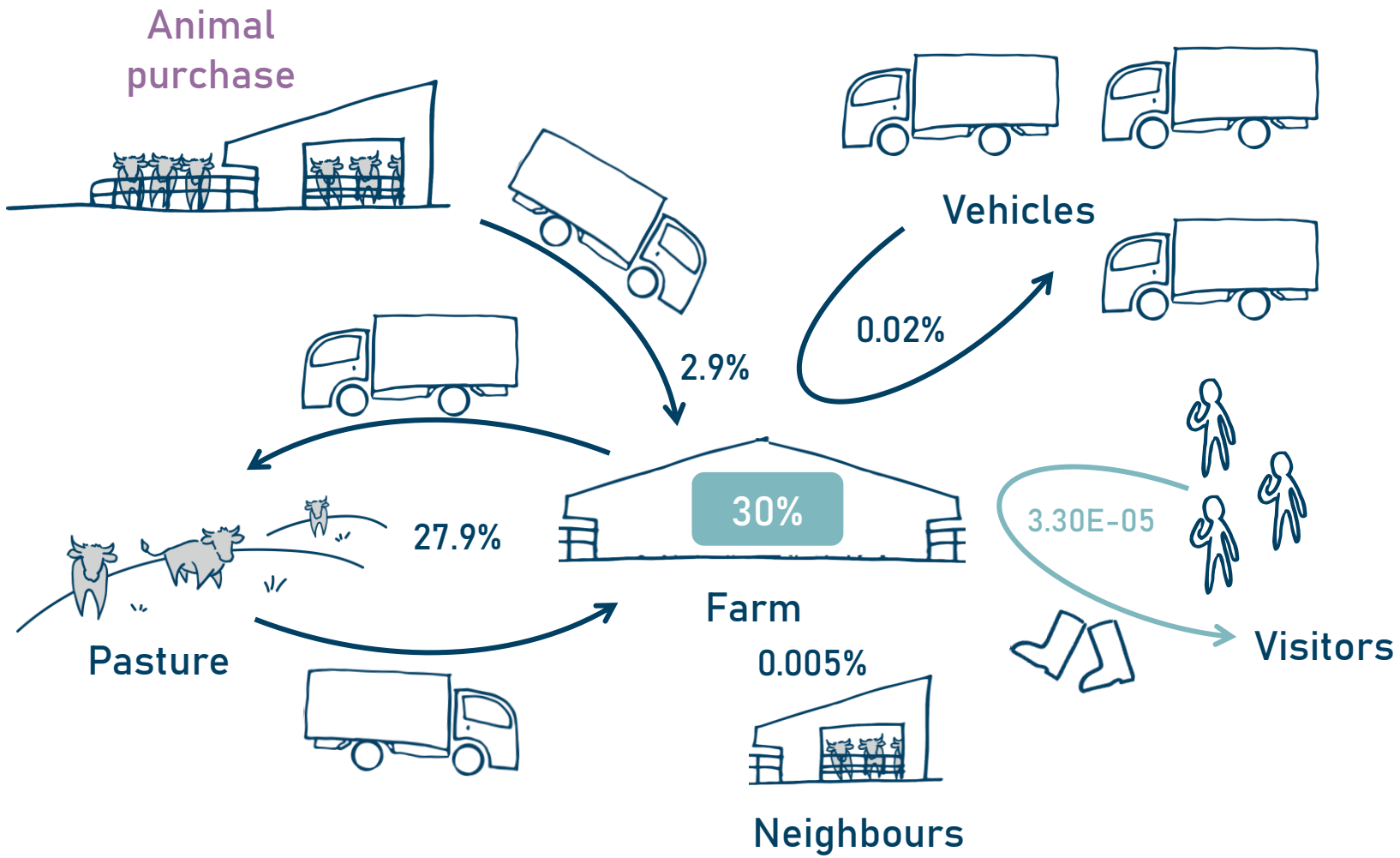
What-if...

Test before purchase	29%
Quarantine and test new animals	29%
Screening all herds before pasture	8%
Do not share pastures	
No vehicles entering the farm perimeter	
Provide boots to all visitors	

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

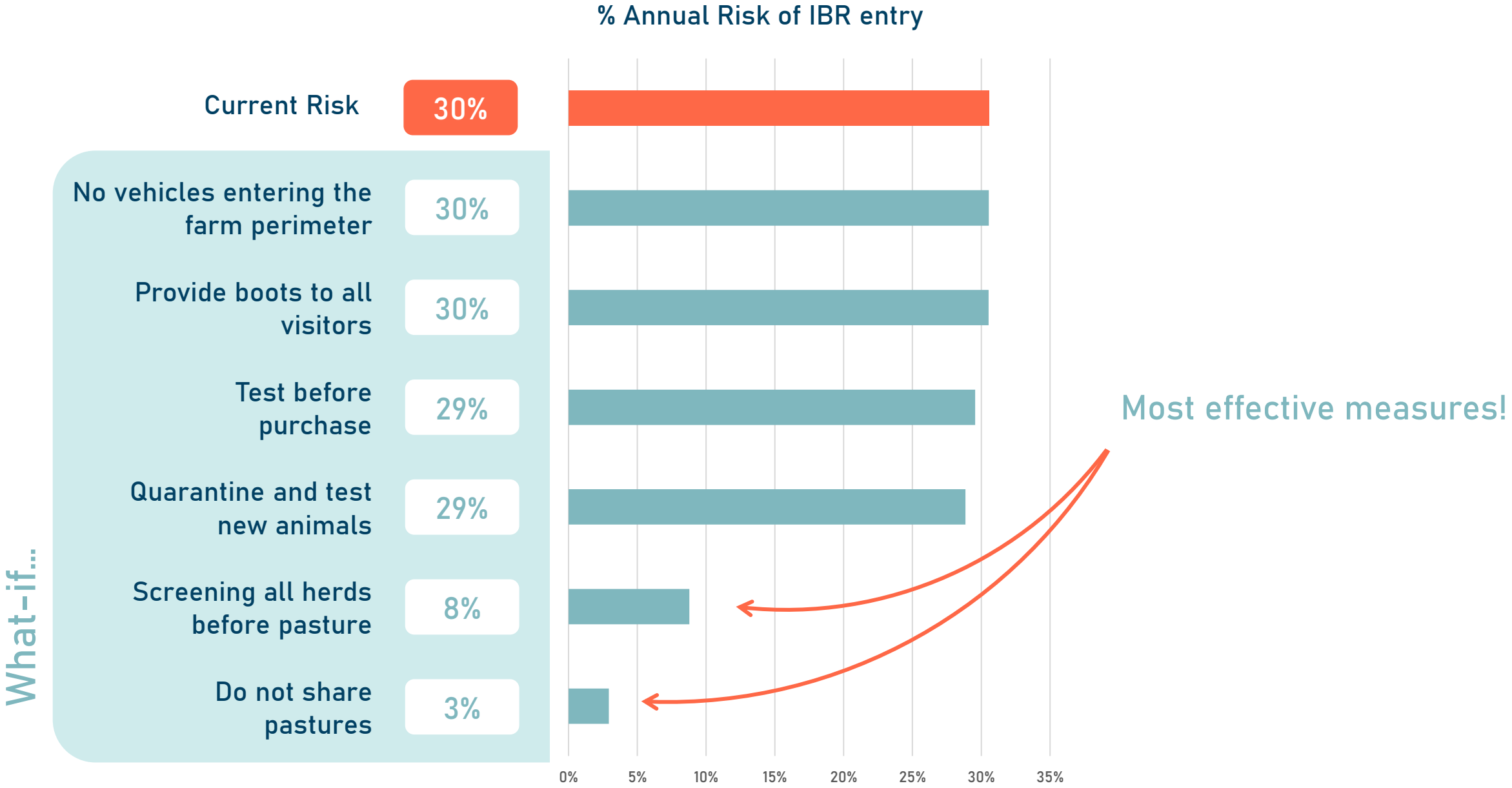
Current Risk **30%**



What-if...

Test before purchase	29%
Quarantine and test new animals	29%
Screening all herds before pasture	8%
Do not share pastures	3%
No vehicles entering the farm perimeter	30%
Provide boots to all visitors	30%

What-if new biosecurity measures were implemented

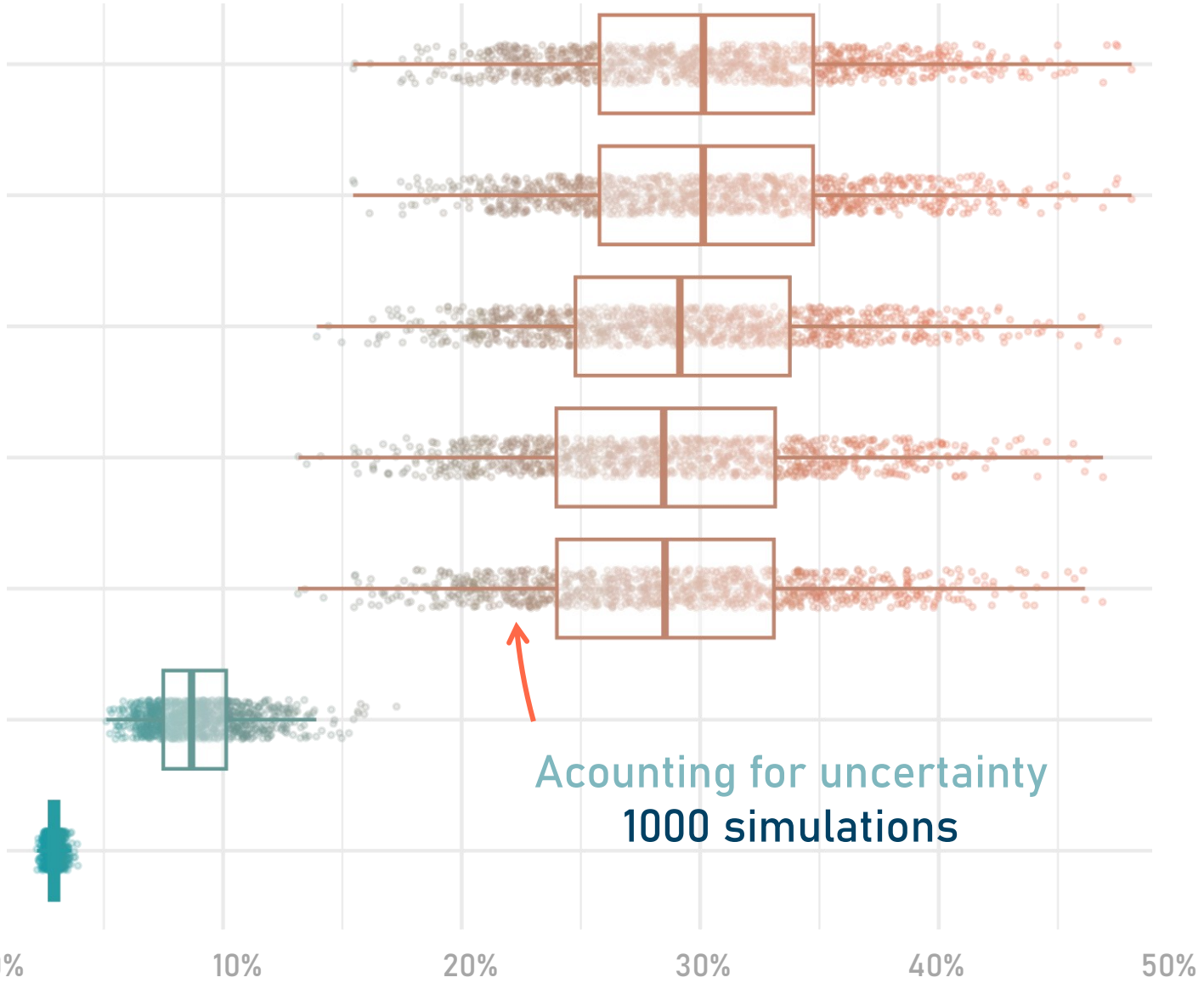


What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

What-if...

Current Risk	30%
No vehicles entering the farm perimeter	30%
Provide boots to all visitors	30%
Test before purchase	29%
Quarantine and test new animals	29%
Screening all herds before pasture	8%
Do not share pastures	3%

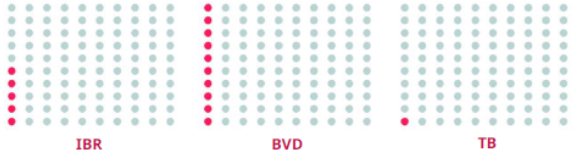


Results: Farm-specific feedback

Informe de risc d'entrada de malalties

ID Granja: bl2_v2 **Data enquesta:** 03-10-2024

La probabilitat anual d'entrada de malalties és del **5%** (3-7%) per a la rinotraqueïtis



infecciosa bovina (IBR), del **9%** (4-17%) per a la diarrea viral bovina (BVD) i del **0,006%** (0,003-0,015%) per a la tuberculosi.

El risc prové majoritàriament de **les entrades de vehicles a la granja** i del **transport d'animals**.

Per reduir el risc de les tres malalties, la mesura de bioseguretat més efectiva és **proporcionar botes a tots els visitants**.

Noves mesures de bioseguretat analitzades:

- No permetre l'entrada de vehicles al perímetre de la granja
- No compartir transport amb altres animals
- Test durant quarantena amb material exclusiu
- Test durant la quarantena
- No compartir transport
- No compartir equipament amb altres granges

Mesures de bioseguretat ja implementades a la granja:

- No permetre contacte directe amb granges veïnes
- Fer proves a tots els animals abans d'anar a concurs
- Netejar i desinfectar el vehicle propi entre transports

La granja no presenta riscos per a les següents vies:

- Entrada d'animals
- Contacte amb la fauna als punts d'aigua

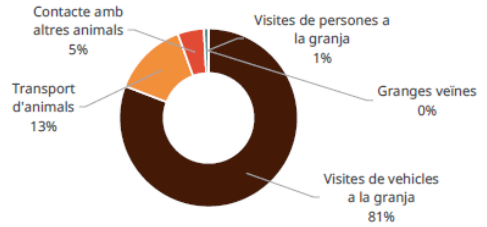
març 2025

Rinotraqueïtis infecciosa bovina (IBR)

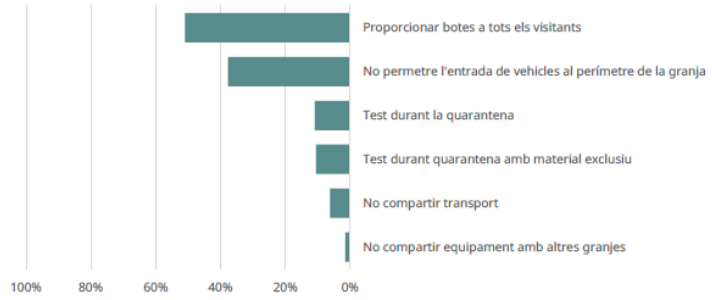
Risc anual d'entrada d'IBR a la granja: **5%** (3-7%)

Per via d'entrada:

- Visites de vehicles a la granja: **4%** (2-6%)
- Transport d'animals: **0,7%** (0,5-0,9%)
- Animals d'altres orígens: **0,04%** (0,03-0,06%)
- Visites de persones a la granja: **0,04%** (0,02-0,06%)
- Explotacions veïnes: **0,004%** (0,0002-0,01%)



Reducció del risc amb mesures de bioseguretat



Results for 5 dairy farms in Catalunya, Spain

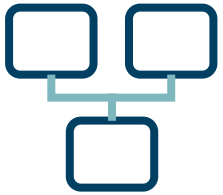
Annual risk of IBR entry relative risk reduction of new biosecurity measures (median)

Biosecurity measure	Dairy 1	Dairy 2	Dairy 3	Dairy 4	Dairy 5
No shared rearing		-0.72%			
Screening herds before rearing		0.79%			
Test before transport	-1				
Own vehicle	-12				
No shared transport	-4.30%	-5.40%			
Vehicle disinfection	-8.20%			-1.70%	
Quarantine (with test)	-20.30%	-18.70%		-67%	
No vehicle entry	-42.70%	-30.40%	-65.10%	-1.50%	-80.50%
Boots for drivers	-36.80%	-43.30%	-32.50%	-0.91%	-16.10%
Boots for visitors	0.54%	0.29%		-0.13%	
No shared equipment	-0.16%	-2.50%	-7%	-0.29%	-0.09%

The most effective measures are different for each farm!

Conclusion

We developed a model to evaluate biosecurity effectiveness on farm-specific contexts using stochastic risk analysis



The modular design allows flexibility for new updates for new pathways, pathogens, and species

This tool can help veterinarians to discuss biosecurity with farmers and provide tailored recommendations that better address their needs

Biosecurity should be tailored to each farm!

Acknowledgements

BIOSECURE

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Teresa Imperial

Fernando Duarte

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More info at: farmrisk.eu

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Doodles: nataliaciria.com/doodles